

AS ✓ 61. (Amended) The liquid ejection recording apparatus according to Claim 60, wherein said liquid ejection head utilizes a film boiling caused when the heat energy is applied to the liquid to eject the liquid droplet via a nozzle.

AB 62. (New) The liquid container according to claim 59, wherein a gravity center of the solid semiconductor element floating in the liquid is positioned below a center of the element, and the floating element rocks stably without rotating in the liquid.

63. (New) The liquid container according to claim 62, wherein a metacenter of the solid semiconductor element is constantly positioned above the gravity center of the solid semiconductor element.

REMARKS

This application has been carefully reviewed in light of the Office Action dated May 24, 2002. Claims 47 to 50, 53, 54, 56 and 58 to 63 are in the application, with Claims 47, 53, 56 and 61 having been amended, Claims 1 to 46, 51, 52, 55 and 57 having been cancelled, and Claims 62 and 63 having been added herein. Claims 47 and 53 are the pending independent claims. Reconsideration and further examination are respectfully requested.

As an initial matter, Applicants confirm the election of Group I, Claims 47 to 61, in response to the restriction requirement. In this regard, Applicants cancel herein the Claims of Group II, Claims 1 to 46. Newly-added Claims 62 and 63 depend from Claim 59 and are therefore believed to be directed to Group I.

Applicants thank the Examiner for the indication in the Office Action that dependent Claims 51 and 52 contain allowable subject matter and would be allowable if

rewritten in independent form. In this regard, Applicants have incorporated the allowable subject matter of dependent Claims 51 and 52 into independent Claim 47, and have therefore cancelled dependent Claims 51 and 52. Accordingly, independent Claim 47 is now believed to be in allowable condition.

The drawings were objected to under 37 C.F.R. § 1.84(p)(5) for allegedly not containing reference symbols mentioned in the description, and for allegedly containing reference symbols which are not mentioned in the specification.

With respect to the objections to the drawings for allegedly not containing reference symbols mentioned in the description, Applicants respectfully submit that the objections with respect to I_a , V , N_a , u_a , H , Z , u_o , Z_a , J , ϕ , f_o , T , ρg , h , I , P_o , and P are in error and should be withdrawn. In particular, these symbols are mathematical variables of mathematical equations which are discussed in the specification for describing inherent properties and attributes of components of the invention. Applicants submit that the mathematical variables are not reference signs and are not required to be described somehow in a drawing pursuant to 37 C.F.R. § 1.84(p)(5). Applicants further submit that the objection to reference symbol "1" is attended to by the amendment to the specification herein, and that the objection to reference symbol "212" is in error because "212" is in fact shown in the drawings at Figures 43 and 44G. With respect to reference signs "1600, 1607, 1500 & 1152", "1011, 1150, & 1012 to 1018", "91, 96" and "1550, 1521, 1522, 1526", Applicants submit that the drawing changes to Figures 34, 36, 39 and 40, respectively, which are submitted herewith for approval, are believed to attend to these objections.

With respect to the objections to the drawings for containing reference symbols allegedly not mentioned in the description, Applicants respectfully submit that the following symbols are mentioned in the description: "805" is mentioned at page 3, line 2 ;

“11 to 18” are mentioned at page 31, lines 9 to 27 ; “101” is mentioned at page 36 , line 18; “405 & 406” are mentioned at page 48, line 12; “31 to 36” are mentioned at page 54, lines 7 to18, and page 55, lines 9 to17; “304b” is mentioned at page 64 , line 11; “600 & 607” are mentioned at page 72, lines 8 and 20; and “151” is mentioned at page 81 , lines 6 to 24. Accordingly, Applicants submit that the objections to these symbols are in error, and request reconsideration and withdrawal of objections to these symbols. With respect to the objections to the remaining symbols allegedly not mentioned in the description, Applicants respectfully submit that the Request For Approval Of Drawing Changes accompanying this Amendment attends to those objections.

Based on the changes to the drawings and the specification, and on the foregoing remarks, reconsideration and withdrawal of all objections to the drawings are respectfully requested.

Claim 61 was objected to under 35 U.S.C. § 112, second paragraph, for alleged indefiniteness. Applicants respectfully submit that amendment to Claim 61 set forth herein renders moot this rejection. Accordingly, reconsideration and withdrawal of the § 112, second paragraph, rejection of Claim 61 are respectfully requested.

Claims 47 to 50 were rejected under 35 U.S.C. § 103 over U.S. Patent No. 6,099,101 (Maurelli) in view of U.S. Patent No. 5,841,448 (Moriyama) and U.S. Patent No. 5,735,167 (Puukangas); Claims 53 and 54 were rejected under § 103 over U.S. Patent No. 5,509,140 (Koitabashi) in view of Maurelli and Moriyama; Claim 55 was rejected under § 103 over Koitabashi in view of Maurelli and Moriyama, and further in view of U.S. Patent No. 5,179,389 (Arai); Claim 56 was rejected under § 103 over Koitabashi in view of Maurelli and Moriyama, and further in view of U.S. Patent No. 5,956,061 (Ahn); Claim 57 was rejected under § 103 over Koitabashi in view of Maurelli and Moriyama; Claim 58 was rejected under § 103 over Koitabashi in view of Maurelli and Moriyama, and

further in view of U.S. Patent No. 5,136,309 (Iida); Claims 59 and 60 were rejected under § 103 over Koitabashi in view of Maurelli and Moriyama; and Claim 61 was rejected under § 103 over Koitabashi in view of Maurelli and Moriyama, and further in view of Arai. Reconsideration and withdrawal of these rejections are respectfully requested.

Turning to specific claim language, amended independent Claim 47 is directed to a communication system in which a solid semiconductor element is used. The communication system includes a plurality of liquid containers, each of which contains a liquid, in which the respective solid semiconductor elements are disposed so that each solid semiconductor element floats in the liquid of one of the liquid containers, respectively, an oscillation circuit formed in the solid semiconductor element and provided with a conductor coil, and information acquiring means for acquiring the information in the container. Also included are receiving means for receiving a signal from the outside, information communicating means for transmitting the information to the outside when a predetermined response condition is satisfied, and an outside resonance circuit, disposed outside the plurality of liquid containers, for generating a power with respect to the oscillation circuit of the solid semiconductor element by electromagnetic induction. The system further includes outside communication means for bidirectionally communicating with the receiving means and the information communicating means of the solid semiconductor element. A gravity center of the solid semiconductor element floating in the liquid is positioned below a center of the solid semiconductor element, and the floating solid semiconductor element rocks stably without rotating in the liquid. A metacenter of the solid semiconductor element is constantly positioned above the gravity center of the solid semiconductor element.

As mentioned above, amended independent Claim 47 now includes the allowable subject matter of former dependent Claims 51 and 52. Specifically, and as stated

in the Office Action, the applied references are not seen to disclose or suggest that a gravity center of the solid semiconductor element floating in the liquid is positioned below a center of the solid semiconductor element, and that the floating solid semiconductor element rocks stably without rotating in the liquid, or that a metacenter of the solid semiconductor element is constantly positioned above the gravity center of the solid semiconductor element. Therefore, amended independent Claim 47 is now believed to be in allowable condition, and such action is respectfully requested

Amended independent Claim 53 is directed to a liquid container in which an ink to be supplied to a liquid ejection head for ejecting a liquid droplet is contained. The liquid container includes a first chamber which is partially connected to atmosphere and in which an absorber for absorbing a liquid is contained, a second chamber which is closed from the outside and in which the liquid is contained, a connection path, disposed in the vicinity of a bottom portion of the container, for connecting the first chamber to the second chamber, and a supply port which is disposed in the chamber, and via which the liquid is supplied to the liquid ejection head. The liquid container also includes first monitor means, disposed in the first chamber, for monitoring a liquid amount of the first chamber. The first monitor means has a first solid semiconductor element which includes at least pressure detection means for detecting a pressure fluctuation of the liquid, information communicating means for transmitting pressure information obtained by the pressure detection means, and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the pressure detection means and the information communicating means. The liquid container further includes a flow rate adjustment apparatus, disposed in the connection path, for adjusting a flow rate of the connection path in accordance with information from the first monitor means. The flow rate adjustment apparatus is a second solid semiconductor element including at least

receiving means for receiving the pressure information transmitted from the first monitor means, an open/close valve which operates in response to the received pressure information, and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the receiving means and the open/close valve.

The applied art, namely Koitabashi, Maurelli and Moriyama, is not seen to disclose or suggest the foregoing features of amended independent Claim 53. In particular, the applied art is not seen to disclose or suggest at least the features of a flow rate adjustment apparatus, disposed in the connection path, for adjusting a flow rate of the connection path in accordance with information from the first monitor means, wherein the flow rate adjustment apparatus is a second solid semiconductor element including at least receiving means for receiving the pressure information transmitted from the first monitor means, an open/close valve which operates in response to the received pressure information, and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the receiving means and the open/close valve.

Koitabashi is seen to be concerned with a removably mountable ink cartridge for an bubble jet printer. (Koitabashi, abstract; Fig. 8A; and col. 2, lines 33 to 63). It is stated in the Office Action that the flow rate adjustment apparatus of amended independent Claim 53 would have been obvious in view of Koitabashi and Maurelli. Applicants strongly disagree with this assertion. It is further asserted in the Office Action that Koitabashi uses “an absorbing member acting as a valve” for a flow rate adjustment apparatus. In this regard, Koitabashi is only seen to teach that absorbing material 4202 can be refilled continuously with ink. (Koitabashi, Fig. 20; and col. 31, lines 54 to 58). The absorbing material of Koitabashi is not seen to be a flow rate adjustment apparatus

disposed in the connection path between the two chambers, much less a flow rate adjustment apparatus that is a solid semiconductor as in amended independent Claim 53.

Maurelli is seen to be directed to an ink jet printhead cartridge that is prevented from being refilled and reused. (Maurelli, abstract; Fig. 3; and col. 2, lines 43 to 58). In particular, Maurelli is seen to use sensors to determine if the cartridge is out of ink, or has been tampered with, in which case use of the cartridge is disabled. However, nowhere is Maurelli seen to disclose or suggest control of the flow rate in the connection path by using a flow rate adjustment apparatus disposed in the connection path for adjusting a flow rate of the connection path in accordance with information from the first monitor means, wherein the flow rate adjustment apparatus is a solid semiconductor element including at least receiving means for receiving the pressure information transmitted from the first monitor means, an open/close valve which operates in response to the received pressure information, and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the receiving means and the open/close valve.

In this regard, Moriyama is not seen to disclose or suggest the flow rate adjustment apparatus of amended independent Claim 53. In particular, Moriyama is seen to be directed to an ink jet head having an energy generating element and an optical element. (Moriyama, abstract; Fig. 1; and col.3, lines 60 to 67). The portion of Moriyama cited in the Office Action is only seen to disclose that a conventional semiconductor sensor is not useful for detecting yellow ink. (Moriyama, col.19, lines 56 to 60). However, Moriyama is not seen to disclose the use of a solid semiconductor for controlling flow rate, much less a solid semiconductor disposed in the connection path between the first and second chambers for adjusting a flow rate of the connection path in accordance with information from the first monitor means. Neither is Moriyama seen to disclose or suggest

a solid semiconductor which comprises at least receiving means for receiving the pressure information transmitted from the first monitor means, an open/close valve which operates in response to the received pressure information, and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the receiving means and the open/close valve.

The other references have been examined and are not seen to remedy the deficiencies of the applied art discussed above.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. § 2143. Applicants submit that a *prima facie* case of obviousness has not been established with respect to amended independent Claim 53. In particular, Applicants submit that each claim limitation of amended independent Claim 53 is not seen to be taught or suggested in the applied references, and that there is not seen to be any identifiable motivation or suggestion in the references, or in the knowledge generally available to one of ordinary skill in the art, to modify the applied references to arrive at the combination of amended independent Claim 53. Instead, Applicants submit that the alleged combinations asserted in the Office Action are merely based on impermissible hindsight in view of Applicants own disclosure in the description and drawings of the subject application. Accordingly, Applicants submit that amended independent Claim 53 is in condition for allowance and such action is respectfully requested.

The remaining claims in this application are each dependent from the independent claims discussed above and are therefore believed patentable for the same reasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office by telephone at (714) 540-8700. All correspondence should continue to be directed to our address given below.

Respectfully submitted,


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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO SPECIFICATION

In the specification, please amend the paragraph at page 55, lines 9 to 17, as follows:

In the ink tank shown in FIGS. 14A and 14B, when the ink of a negative pressure generating member 37 is discharged to the outside via an ink supply port 36, the consumed amount of ink is introduced to the negative pressure generating member 37 from the ink chamber. Thereby, the element 31 [1] in the ink 38 in the ink chamber exists at a given distance from an ink surface H, and moves as the position of the ink surface is lowered with the ink consumption.

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

47. (Amended) A communication system in which a solid semiconductor element is used, comprising:

a plurality of liquid containers, each of which contains a liquid, in which said respective solid semiconductor elements are disposed so that each solid semiconductor element floats in the liquid of one of the liquid containers;

an oscillation circuit formed in said solid semiconductor element and provided with a conductor coil;

information acquiring means for acquiring the information in said container;

receiving means for receiving a signal from the outside;

information communicating means for transmitting the information to the outside when a predetermined response condition is satisfied;

an outside resonance circuit, disposed outside said plurality of liquid containers, for generating a power with respect to the oscillation circuit of said solid semiconductor element by electromagnetic induction; and

outside communication means for bidirectionally communicating with said receiving means and said information communicating means of said solid semiconductor element,

wherein a gravity center of the solid semiconductor element floating in the liquid is positioned below a center of the solid semiconductor element, and the floating solid semiconductor element rocks stably without rotating in the liquid, and

wherein a metacenter of the solid semiconductor element is constantly positioned above the gravity center of the solid semiconductor element.

53. (Amended) A liquid container in which an ink to be supplied to a liquid ejection head for ejecting a liquid droplet is contained, comprising:

a first chamber which is partially connected to atmosphere and in which an absorber for absorbing a liquid is contained;

a second chamber which is closed from the outside and in which said liquid is contained;

a connection path, disposed in the vicinity of a bottom portion of the container, for connecting said first chamber to said second chamber;

a supply port which is disposed in said first chamber, and via which the liquid is supplied to said liquid ejection head;

first monitor means, disposed in said first chamber, for monitoring a liquid amount of said first chamber, said first monitor means comprising a first solid semiconductor element which includes: at least pressure detection means for detecting a pressure fluctuation of the liquid; information communicating means for transmitting pressure information obtained by the pressure detection means; and energy converting

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means for converting an energy applied from the outside to an energy different from said applied energy to operate said pressure detection means and said information communicating means; and

a flow rate adjustment apparatus, disposed in said connection path, for adjusting a flow rate of said connection path in accordance with information from the first monitor means, wherein said flow rate adjustment apparatus is a second solid semiconductor element comprising: at least receiving means for receiving the pressure information transmitted from said first monitor means; an open/close valve which operates in response to said received pressure information; and energy converting means for converting an energy applied from the outside to an energy different from said applied energy to operate said receiving means and said open/close valve.

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56. (Amended) The liquid container according to claim 53 [55], wherein said first solid semiconductor element is disposed above a liquid surface of said first chamber when a liquid supply to said first chamber from said second chamber is possibly interrupted, and in a position in which a pressure fluctuation can be detected.

61. (Amended) The liquid ejection recording apparatus according to Claim 60, wherein said liquid ejection head utilizes a film boiling caused when the heat energy is applied to the liquid to eject the liquid droplet via a nozzle.